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(54) CONSTRUCTION MATERIAL FOR BUILDING

(71) We, IDEMITSU KOSAN COMPANY LIMITED, a Company organised and existing under the laws of Japan of No. 1-1, 3-Chome, Marunouchi, Chiyoda-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention is concerned with constructional material for building.

In recent years, prefabricated housing has been popularized and prefabricated panels are adopted in most cases. However, this method of construction requires a fixed unit length of about 900 millimeters (module dimension), and so design is restricted by multiples of this unit length. In addition, each unit length is not common to all panels. Therefore, some main panels must be manufactured at a factory or the varieties of panel must be increased at need.

The present invention provides an elongate building element which comprises an elongate shell of hollow polygonal section and core material filling the shell, the cross-sectional shape of the shell being that of an L-shaped hexagon.

In a building element as set forth in the last preceding paragraph, we prefer that the shell is made of light concrete, aluminium, thermosetting resin, thermoplastic resin, filler-blended thermosetting resin or filler-blend thermoplastic resin.

In a building element as set forth in either of the last two immediately preceding paragraphs we prefer that said core material is an inorganic substance selected from calcium silicate, calcium sulfate, cement and autoclaved light weight concrete or an organic substance selected from foamed plastics material, wood, sawdust, chaff and straw, the cross-sectional shape of the shell being that of an L-shaped hexagon.

There now follows a detailed description which is to be read with reference to the accompanying drawings of various elements according to the invention; it is to be clearly understood that these elements have been selected for description to illustrate the invention by way of example and not by way of limitation.

In the accompanying drawings:

Figure 1 is a perspective view of two elements according to the invention stacked one upon the other;

Figure 2 is a plan view of one of the two elements shown in Figure 1; and

Figures 3A to 3D are plan views of a series of elements according to the invention arranged in different relationships to one another.

A building element according to the present invention is elongate in appearance and comprises a hollow shell having a polygonal section and a core material which fills the interior of the frame. The thickness of the shell is dependent to some extent upon the materials used but usually it is 1/20 to 1/5 of the wall thickness. When the shell is made of a resin, the element may be of any desired length and may be used, not only singly but in side-by-side relationship to form a panel.

As shown in Figure 2, the cross-sectional shape of the illustrated element according to the invention is an L-shaped hexagon.

The ratio of the lengths *a, b* of the outer sides is preferably set to be 1:1 in order to facilitate joining of two or more of said elements. However, the dimensions *a, b* may be different. For example, when the ratio of the dimensions *a, b, c* as shown in Figure 5 is set as *a:b:c* = 3:2:1, a composite structure having the sectional shape of a square is prepared by combining two of these elements (as can be seen from Figure 6 (C)). Furthermore, various types of panels having stable mechanical strength can be assembled by determining the length of each side. Especially, when these lengths are set as a:b:c:d =

3:2:1:1.5, various forms of panels can be easily assembled as shown in Figures 6 (A) to 6 (D).

This type of element according to the present invention is preferably utilized for providing pillars, beams, foundations, panels and the like in housing construction.

Sufficient mechanical strength can be obtained when appropriate adhesive is employed between adjacent elements. Accordingly, upon joining the elements, joining can be effected with the elements horizontal or vertical, and thus working efficiency at a construction site is improved remarkably.

The shell is made of a substance selected from thermosetting resin, thermoplastic resin, filler-blended thermoplastic resin and filler-blended thermosetting resin. As the thermosetting resin, epoxy resin, unsaturated polyester resin, melamine resin, phenol resin, urea resin, alkyd resin and the like can be used. Examples of thermoplastic resins which can be used are polymethyl methacrylate, polyacetal, polycarbonate, polyester resin, polystyrene, polyamide polyvinyl chloride and the like. Furthermore, light concrete and aluminium can also be used as the material of the shell.

As to fillers which can be blended with the above mentioned resins, organic substances such as carbon black, carbon fiber, coal (dust), cellulose, ∝-cellulose, cotton yarn (mercerization), rind of unhundled rice, graphite, jute, nylon yarn (mercerization), polyacrylonitrile yarn (e.g. Orlon (TRM) produced by E.I. due Pont de Nemours & Co. Inc.), rayon yarn, sisal hemp yarn, ethylene tetrafluoride fibre, wood dust, et cetera and inorganic substances such as alumina (foil), alumina fine powder (hydroxide), alumina powder, asbestos, bronze, calcium carbonate, calcium silicate (meta-), calcium silicate, white porcelain clay, white porcelain clay (burned), mica, molybdenum disulfide, silica (uncrysallizable), talc, glass fiber, et cetera, can be used. The filler is preferably mixed at a rate of less than 80 weight % to the resin in order to improve its strength.

As the core material which fills the interior of the shell material, inorganic substances and organic substances are available, the inorganic substances being selected from calcium silicate type material (for example, calcium silicate, silas baloon, pearlite, etcetera) calcium sulfate, cement and autoclaved light weight concrete, and the organic substances being selected from plastics foamed materials (for example, polystyrene foam, polyurethane foam, urea resin foam, polyethylene foam, polypropylene foam), wood, sawdust, chaff and straw. The core materials are preferred to be light weight, and it is possible to improve the strength by using metal wire such as piano wire; glass fibre; whisker at need.

The adhesive for joining two elements may be unsaturated polyester resin, epoxy resin, phenol resin, melamine resin, urea resin, polyvinyl acetate resin; bolts, nails, cramps and the like may also be used.

By utilizing elements according to the present invention, the design and construction of a prefabricated house can be varied. Transportation efficiency and execution efficiency are largely improved, and design and estimation can be mechanized. Moreover, elements according to this invention are superior to wood in humidity-insulation efficiency.

WHAT WE CLAIM IS:

1. An elongate building element which comprises an elongate shell of hollow polygonal section and core material filling the shell, the cross-sectional shape of the shell being that of an L-shaped hexagon.

2. An elongate building element according to Claim 1 wherein the shell is made of light concrete, aluminium, thermosetting resin, thermoplastic resin, filler-blended thermosetting resin or filler-blended thermoplastic resin.

3. An elongate building element according to either one of Claims 1 and 2 wherein the core material is an inorganic substance selected from calcium silicate, calcium sulfate, cement and autoclaved light weight concrete or an organic substance selected from foamed plastics material, wood, sawdust, chaff and straw.

4. An elongate building element according to Claim 1 substantially as hereinbefore described with reference to the accompanying drawings.

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1573146 COMPLETE SPECIFICATION
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

FIG.1

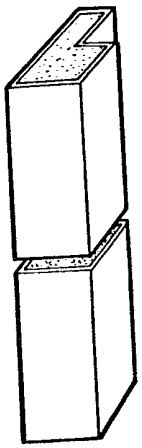

FIG.2

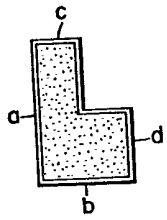

FIG.3 (A)

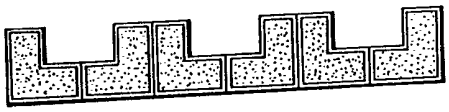

FIG.3 (B)

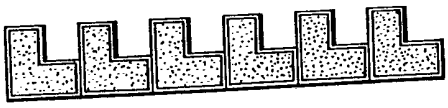

FIG.3 (C)

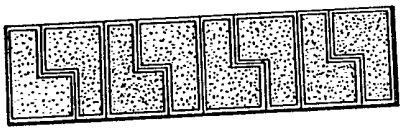

FIG.3 (D)